

**SERIAL NO. 09/542,189****PATENT**  
**Docket RAL920000008US1****REMARKS**

This amendment is in response to the office action mailed on September 16, 2004. The responses are in the order in which the issues were raised in the office action.

**A. Claim Objection**

Claim 28 is objected to because in line 9 FIFO was not preceded by the definite article "the." In response the claim is amended according to the Examiners suggestion.

**B. Claims Rejections – 35 U.S.C. 112**

Under this section of the office action claims 1,2,11,12,14 and 26 are rejected. For brevity the Examiner's arguments supporting the rejection are not repeated. However, each of the rejections is reviewed in detail and related claim is amended in a way that applicant's believe remove any indefiniteness which may have been in the claim.

**C. Rejection of Claim 11-16 and 19-23**

Claims 11-16 and 19-23 are rejected under 35 U.S.C. 102 (e) as being anticipated by Parady, US Patent No. 5,933,627.

In response applicant respectfully disagree with the Examiner's position and argue that Parady, US Patent No. 5,933, 627 does not teach or suggest "queuing the multiple execution threads to have over lapping access to the accessible data in said tree search structure," as is required by all of the claims in this section of the rejection. It is settled law that in order for a reference to anticipate a claim all the

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limitations of the claim must be found in a single reference. As argued above the recited element of the rejected group of claims is not present in the reference. Therefore, the reference does not anticipate the claims. In addition the dependent claims are also separately patentable. For example claim 12 calls for the thread execution control includes control logic for temporally transferring the control to the next thread when execution stalls due to a short- latency event, and for returning control to the original thread when the latency event is completed. No such teaching is set forth in Parady. In Parady switching occurs only on long –latency event. See Parady abstract.

**D. Rejection of Claim 1-6 and 9-10**

Claims 1-6 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parady, as applied above in view of " Data structures and program design in C++, 1999" by Robert L. Kruse and Alexander J. Ryba.

In response applicants respectfully disagree with the Examiner and argues the Examiner has failed to make out a prima facie case of obviousness. As a consequence the claims are not obvious. To make out a prima facie case of obviousness the Examiner is obligated to show motivation existed in at least one of the references and the combination teaches all limitations of the claimed invention; MPEP-2142. For reasons set forth herein these criteria have not been met. Therefore, the claims are not obvious.

**1. Reference Fail to Suggest Motivation to Combine**

Claim 1, in part, states "queuing the multiple execution threads to have overlapping access to the accessible data in said tree search structure."

US Patent No. 5,933,627 (Parady) teaches a mechanism for switching

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between threads of a processor on the occurrence of a long-latency event. See abstract and Col 3 line 50-64.

The Kruse and Ryba article teaches binary search trees for searching a link list for some target keys. It is applicants' contention an artisan viewing the subject patent and Kruse/Ryba article would not form the combination suggested by the Examiner because tree structures are usually not used with the type of memory set forth in the patent. Usually, tree structures are used with slow memories such as DRAM, DDRAM etc., to improve the speed with which data can be accessed. In high performance memory such as the L2 cache set forth in figure 2 and cache RAM set forth in Figure 5 and 6 (Parady) there is no need to use tree structures. The reason is that these types of memory are expensive to begin with and are also high speed. Therefore, using tree structures in these memories would not be economical or otherwise justifiable. In fact the teachings of Parady and like systems with these types of high performance memory would lead one away from associating Parady and such systems with the tree structure set forth in the Kruse/Ryba article. As a consequence, it is applicants contention that an artisan viewing these references separately or together would not form a combination that renders the claims obvious. As a consequence the Examiner has not met his burden of proof to support a finding of motivation.

Applicants note that the Examiner relied on teaching in the Kruse/Ryba article to form the combination. However, as argued above and incorporated herein by reference the very nature of the memory set forth in Parady reference militates against the reason given by the Examiner for the combination.

## **2. Combined References Failed to Teach Limitations of the**

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Element b) of claim 1 in part calls for the multiple execution threads to have over lapping access to the accessible data .. it is applicants contention that this feature of the claim is not present in any of the cited references. As argued above and incorporated herein by reference Parady teaches switching between threads based upon long-latency events. Kruse/Ryba article teaches binary tree structure. But no where in anyone of these references is the suggestion of threads having over lapping access to data. As a consequence applicants argue that even after the examiner combination the resulting reference fails to teach the feature of applicants claim. As a consequence the Examiner has not established a prima facie case of obviousness. Therefore, the claims are not obvious in view of the reference.

Furthermore, applicants argue that providing over lapping access to the execution threads results in an increase of the over all system speed. This applicant argues is a benefit to the user. In addition, as set forth above and incorporated herein by reference element b) of claim 1 is a novel process step. Applicants contend that the novel process together with benefit are clear evidence of non obviousness.

**E. Rejection of Claim 8**

Claim 8 is rejected under 35 U.S.C 103(a) as being un-patentable over Parady in view of Kruse as applied above, and in further view of Flynn et al. US Patent No. 6,052,708.

Claim 8, by reason of its dependency incorporates the elements and function of claim 1. The reference cited against claim 8 are Parady in view of Kruse and further in view of Flynn et al., US Patent No. 6,052,708. The argument set forth above regarding the patentability of claim 1 with respect tp Parady in view of Kruse

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are equally applicable and are incorporated herein by reference. The deficiency identified relative to Parady and Kruse are not provided in Flynn et al. reference. Therefore, for reasons set forth above claim 8 is patentable over the art of record. Because US Patent No. 6,052,708 (Flynn et al.) does not provide deficiencies identify relative to Parady, Kruse, and Flynn et al. appears to be cumulative.

In addition claim 8 is separately patentable. The claims call for a separate instruction prefetch buffer .. collecting instruction in a prefetch buffer for its execution thread when thread is idle and when the instruction bandwidth is not being fully utilized. As is clear from the language of the claim the condition under which prefetch buffer prefetches instructions is, to wit, namely: when the thread is idle and when the instruction bandwidth is not being fully utilized. US Patent No. 6,052,708 (Flynn et al.) does not teach the feature "when the instruction bandwidth is not being fully utilized." There is no suggestion or teaching in Flynn et al. regarding this feature regarding applicants claim. Therefore, even after the Examiners combination the resulting reference would not render applicants claim obviousness because this feature of applicants claim is not present. In this regard claim 8 is separately patentable over the art of record.

#### **F. Rejection of Claim 18**

Claim 18 is rejected under 35 U.S.C.103(a) as being un-patentable over Parady, as applied above, in view of Flynn as applied above.

In response applicants respectfully disagree with the Examiner and argue that Claim 18 is not obvious in view of Parady and Flynn because the combined references do not teach a) queuing the multiple execution threads to have overlapping access to the accessible data (Claim 11 b1) .. means for collecting instructions in prefetch buffer for idle execution threads when instruction bandwidth is not being fully utilized (Claim 18). Because these elements single or in combination

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are not present in the Examiners combination the Examiner has failed to make out a prima facie case of obviousness. Therefore, claim 18 is not obvious in view of the teachings of the references.

**G. Rejection of Claim 26**

Claim 26 is rejected under 35 U.S.C. 103(a) as being un-patentable over Parady in view of Lee et al. US Patent No. 5,404,560 (as applied in the previous office action and herein referred to as Lee), and further in view of Flynn, as applied above.

In response applicants argue Claim 26 is not obvious because the Examiner has failed to make out a prima facie case of obviousness, a necessary prerequisite for all rejections under 35 U.S.C 103. The law as it applies to the obligation of the Examiner to make out a prima facie case of obviousness is stated above and incorporated herein by reference. In particular, the Examiner is obligated to show motivation or set forth logical reason why an artisan viewing the references would form the combination and after the combination all elements and limitations of the claim is found in it. With respect to motivation for the combination none could be found in any of the references cited by the Examiner. Likewise, the Examiner has not identified any such motivation relative to the references.

Even though the reference fails to teach a motivation for the combination the Examiner could still establish a prima facie case of obviousness by setting forth concrete and logical arguments why an artisan viewing the references would form the combination. It is applicants' contention that the Examiner has not done so. With respect to the combination of Parady and Lee the Examiner seems to argue the need to prevent over write in the buffer would necessitate the need to check for fullness. (Page 12 item 40 of the office action) Applicants believe this reason is neither concrete nor logical. Our position is based on the fact that in Parady (FIG 3)

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the dispatching unit 28 moves instruction from instruction buffer into the execution unit 41. Depending on the speed of the dispatching unit 28 and execution unit 41 the instructions that are removed from the buffer are moving at a higher rate than the amount that is placed in the buffer. With this scenario there would be no need for testing to determine if a particular instruction buffer is full. In addition, there are other design techniques that can be used to indicate no need for testing. With respect to the reason for combining Flynn the Examiner seems to argue "it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Parady buffer to prefetch instructions for an inactive thread (Office Action, Item 37, Page 12)." This appears to be a conclusion rather than a concrete reason. As a consequence it should be rejected out of hand.

In addition the Examiner failed to establish a *prima facie* case in that all the elements of the claim is not present in the combination. The claims calls for "determining whether the threads associated with the prefetch buffer is active." As to this element, the Examiner failed to provide prior art and appears to rely on inherency.

Notwithstanding, it appears as if inherency cannot be used to reject a claim under 35 U.S.C.103(a). *In re Shefty*, 566 F.2d 81, 195 U.S.P.Q 753.

#### **H. Rejection of Claims 27-29 and 31**

Claims 27-29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Joy et al., US Patent No. 6,341,374 (as applied in the previous office action and herein referred to as Joy), in view Kruse, as applied above, and further in view of Anderson et al. US Patent No. 5,613,144 (herein referred to as Anderson). In addition, the free online dictionary of computing (FOLDOC), 1999, is cited as extrinsic evidence showing the meaning of "FIFO" (first-in first-out) and attached to the office action.

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In response applicant's respectfully argue the Examiner has failed to make out a prima facie case of obviousness. Therefore, Claims 27-29 and 30 are not obvious in view of the references. The law as it applies to the obligation of the Examiner to make out a prima facie case of obviousness is stated above and incorporated herein by references. In particular, there is no suggestion or motivation to combine in any of the cited references. Notwithstanding the Examiner can still make out a prima facie case of obviousness if logical and concrete reason why an artisan viewing the references would form the combination is set forth in the rejection, In this situation there appears to be no logical or concrete reasons for the combination. Instead, the Examiner sets forth complex and difficult to understand arguments as to why the combination would have been obvious. As to these arguments applicants contend that they are too complex and difficult for an artisan to follow. Therefore, the very complexity of the arguments should be construed as evidence of lack of motivation for combining the references.

In addition, applicants argue that it appears as if the Examiner misconstrued the teaching which can be reasonably deducted from Kruse on page 369-370. In particular the Examiner stated on page 14 of the office action " a priority FIFO, according to Kruse on pages 369-370, is specifically useful in time-sharing computer systems, which have a number of tasks (threads), each of the tasks having a corresponding priority. Consequently, since Joy has taught one of multiple tasks are selected on priority, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Joy to include a priority FIFO to hold these tasks because Kruse has taught that the priority FIFO structure which is able to provide such functionality."

Applicant respectfully disagrees with this interpretation of Kruse. The Kruse references gives a definition of priority ques only. It is applicants contention a priority queue is not the same entity as a FIFO buffer. Therefore, the Kruse teaching of

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priority queues is irrelevant to applicants claim. In addition, the Examiner equating this teaching of priority queues in Kruse with FIFO buffers appears to be error.

Finally, applicants argue that the Examiner has not made out a *prima facie* case of obviousness because every element of Claim 27 and its dependent claims are not found in the Examiners combination. In particular, the combination fails to teach elements a) and c) of Claim 27. Because the examiner failed to make out a *prima facie* case of obviousness claims 27-29 and 31 are not obvious in view of the references.

### **I. Rejection of Claim 30**

Claim 30 is rejected under 35 U.S.C. 103(a) as being un-patentable over Joy in view of Kruse, in view of Anderson, as applied above, and in further view of Cutler et al. US Patent No. 5,752,031 (herein cited to as Cutler)

Claim 30 depends on Claim 27 and as a result of this dependency it inherits all the elements of Claim 27. The argument set forth above in supporting the patent ability of Claim 27 over Joy, in view of Kruse, in view of Anderson, is equally applicable and is incorporated herein by reference. The deficiency set forth above relative to these references are not provided by Cutler et al. US Patent No. 5,752,031. In this regard Cutler et al appears to be cumulative. As a consequence Claim 30 is patentable over the art of record for reasons set forth in arguing the patent ability of Claim 27 over the art of record.

### **J. Rejection of Claims 1-7, 9-17, and 19-23**

Claims 1-7, 9-17, and 19-23 are rejected under 35 U.S.C. 103(a) as being un-patentable over Joy et al. (US Patent No. 6,341,374) and Kruse.

In response applicants contend these claims are not obvious because the

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Examiner has not made out a prima facie case of obviousness. A prima facie case of obviousness requires the Examiner to show motivation based upon disclosure in one of the references and every element of the claim must be taught in the combination. With respect to motivation applicants argue that none of these references suggest motivation and the Examiner has not identified such teachings in any of the references. In addition, the Examiner's combination does not teach all of the elements and limitations of applicants claims. For example 1-7, 9 and 10 call for "queuing the multiple execution threads to have over lapping access to the accessible data available in said tree search structure." This element is not present in the Examiners combination. Therefore the claims are not obvious. With respect to claims 11-17, they call for " queuing the multiple execution threads to have over lapping access to the accessible data." This element is not present in the Examiners combination. Therefore, these claims are not obvious. Finally, Claims 11-23 call for " queuing the multiple execution threads to have over lapping access to the accessible data." This feature is not found in the Examiners combination therefor these claims are not obvious.

**K. Rejection of Claims 8 and 18**

Claims 8 and 18 are rejected under 35 U.S.C. 103(a) as being un-patentable over Joy (US Patent No. 6,341,347) in view of Kruse as applied above, in view of Parady (US Patent No. 5,933,627), as applied above, and further in view of Flynn (US Patent no. 6,052,708) as applied above.

As argued above and incorporated herein by reference Claims 8 and 18 are not obvious because the examiner fails to make out a prima facie case of obviousness. Two elements required for making out a prima facie case of obviousness is not met. In particular, no motivation is suggested in any of the references that would lead an artisan to form the combination. In addition, the

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Examiner has not presented a logical and concrete argument as to why an artisan viewing these references would form the combination. Regarding, the element of motivation for combining none were found in any of the references. Each of these references teaches separate and independent inventions with no suggestion as to how a workable combination could be formed to render applicants claims obvious. As to the argument raised by the Examiner to justify the combination it is applicants contention the arguments are to complex and difficult for an artisan to follow. Therefore, these argument should be characterized as indicia of non obviousness. As a consequence Claim 8 and 18 are not obvious and are patentable over the art of record.

**L. Rejection of Claims 24 and 25**

Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being un-patentable over Joy, as applied above, in view of Parady, as applied above, in view of Flynn, as applied above, in view of Kruse, as applied above, and further view of Anderson, as applied above.

In response, applicants argue that the claims are not obvious because the Examiner has not made out a prima facie case of obviousness as is required for rejection under 35 U.S.C. 103. In particular, there are no suggestion or motivation for the combination expressed in any of the references. As argued above and incorporated herein by reference the argument set forth by the examiner to justify the combination is rather complex and could not be grasped by an artisan viewing these references. As a consequence the claims are not obvious.

In addition, applicants contend even after the combination the resulting combination would not render the claim obvious because elements recited in the claim are not found in the Examiners combination. For example, the claim calls for pipeline co-processor and first co-processor performing specific functions as recited

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in the claims. These elements are not found in any of the cited references. Therefore, the combination would be void of these elements. Because the Examiner has not made out a prima facie case of obviousness the claims are not obvious in view of these references.

As to the newly added Claims 32, 33 and 34 they are patentable over the art of record for reasons set forth above.

It is believed the present amendment answers all the issues raised by the Examiner. Reconsideration is hereby requested and an early allowance of all the claims is solicited.

Respectfully submitted,



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